

EmPower Nigeria

Improving Nigeria's electricity supply industry through public education

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Nextier Power is a consulting firm that provides policy advisory, investment advisory, and support services to the electricity supply industry. The firm aims to use this weekly publication to educate Nigerians on the intricacies of the Nigeria electricity supply industry on the assumption that a more informed public would advocate for the right policies and programmes which, in turn, would lead to a robust market that delivers the electricity needs of Nigerians. This column will cover everything from the basics of the industry to the more intricate, sometimes, complex policies and programmes.

How Electricity Distribution Works

Introduction

Distribution is the final stage of the electric power supply value-chain. This stage entails “carrying” electricity from the transmission grid to the end-user or individual consumer. Outlining the process in this manner - from the grid to the consumer - could be misleading as it portrays a simple and straightforward process contrary to the complexities involved in the distribution process.

Distribution Process The distribution network comprises a number of components starting from substations that are connected to the transmission grid through to step-down transformers that reduce transmission voltage to a level suitable for end-user consumption before the electricity is transmitted to the consumers through distribution lines. Large consumers are however connected directly without a step-down transformer.

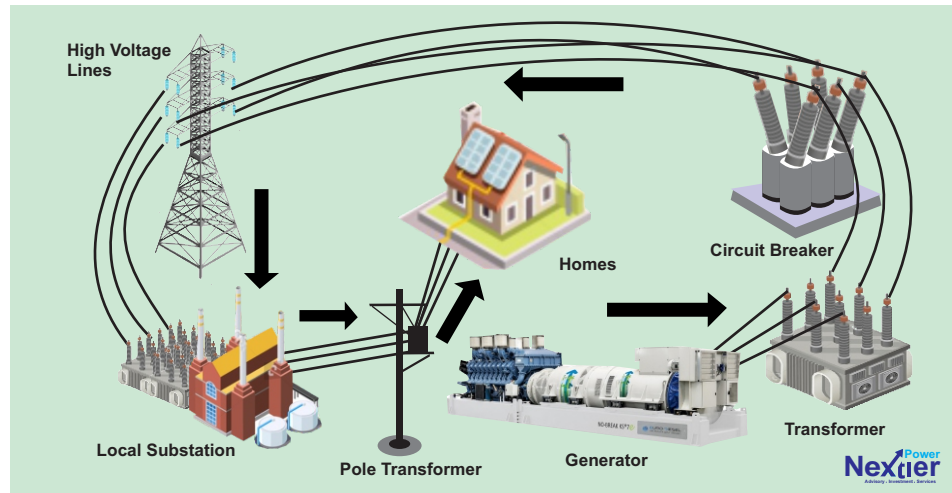
Distribution Systems

The distribution system can be designed in three different ways - radial, loop and network systems - for electricity delivery to consumers. These three systems are frequently used as a combination but in some cases, they are used independent of each other.

The **radial system** is arranged like a tree where each customer has only one source of power supply. This is the cheapest system to design and is commonly used in rural or suburban areas. However, this system poses a challenge in the event of a disruption in power supply because the cause of the disruption must be identified and rectified before power can be restored.

The **loop system**, as the name implies, circles through the service area and returns to its point of origin. This system has two power sources (main source and alternate source) for a group of customers. Switches are placed in strategic locations and power is supplied to customers from either source. Unlike the radial system, the alternate power source provides electricity to the connected customers in the event of disruption from the main source. This system provides better continuity than the radial system as in the event of a fault from the main source; the alternate source comes on line to provide electricity to customers. In this case, a brief window of disruption occurs when switching over to the alternate source. The disruption is typically not as long as with the radial system. Due to their more complex nature, loop systems are relatively more expensive to configure than the radial system.

The **network system** provides electricity to its customers through multiple power sources operating in parallel or in a cobweb format. In simplified terms, a customer can be supplied from two or



more power sources. This system is the most reliable and most expensive of the three as it gives the option of multiple power sources thereby reducing or eliminating power supply disruptions. It is used in congested, high load density areas.

Growth of the Distribution Sector

During the early stages of the Nigerian electricity supply industry, the sector model was designed as a natural monopoly therefore every stage of the power supply value-chain was managed by the Federal Government. This practice continued until the year 2001 when the government set out to reform the sector. The need for private sector input became evident and agencies were set-up to oversee the sale of assets and ensure a smooth privatisation process. The process led to the privatisation of the generating and distributing stages of the power supply value chain, leaving transmission to the government. Today, Nigeria has eleven companies in charge of electricity distribution across the country with the government owning 40 per cent equity in each company. The electricity distribution companies (DisCos) include:

DisCos	Geographic Coverage (States)
Abuja	FCT, Niger, Nasarawa, Kogi
Benin	Edo, Delta, Ekiti, Ondo
Eko	Lagos (Ikoyi, VI, Lekki, Epe, etc.)
Enugu	Imo, Anambra, Ebonyi, Abia, Enugu
Ibadan	Oyo, Ogun, Osun, Kwara
Ikeja	Lagos (Ikeja, Surulere, Ikorodu, etc.)
Jos	Plateau, Bauchi, Benue, Gombe
Kaduna	Kaduna, Sokoto, Kebbi, Zamfara
Kano	Kano, Jigawa, Katsina
Port Harcourt	Rivers, Bayelsa, Cross River, Akwa Ibom
Yola	Adamawa, Borno, Taraba, Yobe

These DisCos have licenses issued by NERC to distribute power to consumers in their areas of geographic coverage.

DisCos and Consumers

Aside from using its distribution network to provide electricity to customers, the electricity distribution companies in Nigeria are responsible for operation and maintenance of the distribution network, customer connection, installation, maintenance and reading of meters, billing and collection among others. Customers should look to their respective distribution companies for any of the

above-mentioned services.

Nigeria's distribution system is mostly modelled using the network system design with an insignificant share, primarily in rural areas, modelled using the radial system. One would wonder why the country is still plagued by severe power supply disruption despite operating the preferred network system.

Challenges

The distribution segment of the Nigeria electricity supply industry (NESI) is plagued by a series of challenges that can be traced back to the pre-privatisation era. Majority of these challenges originate from the initial power sector model that led to a near-death situation in the entire electricity sector. This model failed to give a proper reflection of the cost of power as electricity tariff was heavily subsidised. Today, liquidity issues have crippled the distribution segment of NESI. As of March 14, 2017, it was revealed that the Ministries, Departments and Agencies (MDA) of the Nigerian government owe a debt of over N50 billion to the power distribution companies.

Another challenge in distribution is the current electricity tariff. Despite a 45 per cent increase in tariff which was implemented in 2014, distribution companies are still pushing for further increase in tariff as they argue that the tariffs are not cost-reflective; that is, they do not cover the cost of generating and supplying electricity and makes it difficult for the power companies to break-even.

The DisCos also have a challenge with their billing system. Currently, less than half of Nigerians connected to the electricity grid are metered. Most customers receive estimated bills, which means that most of the bills spent to these customers are based on guesstimates. The implication of this practice is that while some consumers may get a bill with figures that are significantly higher than what they actually consume, other customers would get a bill that does not reflect their actual electricity consumption for the given time frame. With such discrepancies, accountability becomes difficult and customer dissatisfaction runs high.

The challenges mentioned above simply mean that the electricity distribution companies would find it difficult to fulfil their financial obligations to the rest of the companies in the electricity supply chain. When the DisCos fail to remit the appropriate amounts to the sector, the Transmission Company of Nigeria and the generation companies (GenCos) will not be able to meet their own financial obligations to their supplies. This funding gap results in an electricity supply gap resulting in frequent disruption in power supply.

Based on the above scenario, one can understand why the distribution arm of the power supply value chain in Nigeria has failed to function at optimal level. Distribution plays a key role in the value chain as the cash flow required to keep every segment running smoothly comes primarily from distribution. If Nigeria is going to improve its electricity supply industry to the point where power supply matches demand, the liquidity issue and other challenges must be addressed.

Conclusion

In conclusion, every stage of the power supply value chain is important as they compliment each other. No one stage is more important. However, being that liquidity is the primary challenge of the sector, and the distribution companies are at the forefront of revenue generation across the value-chain, efforts need to be made to ensure they are able to meet their financial obligations. As a first step, Federal Government of Nigeria needs to reach an agreement with the DisCos on a plan to payoff its debts to the sector. It is simply the right thing to do and also gives the government the moral basis to ask other Nigerians to pay their bills. Furthermore, Nigerian Electricity Regulatory Commission should approve cost-reflective tariffs. The distribution companies should ensure every customer is provided with a pre-paid meter. In fact, the government should set a date when all customers should stop paying estimated bills. It is probably the incentive the DisCos need to ensure all customers are metered.

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